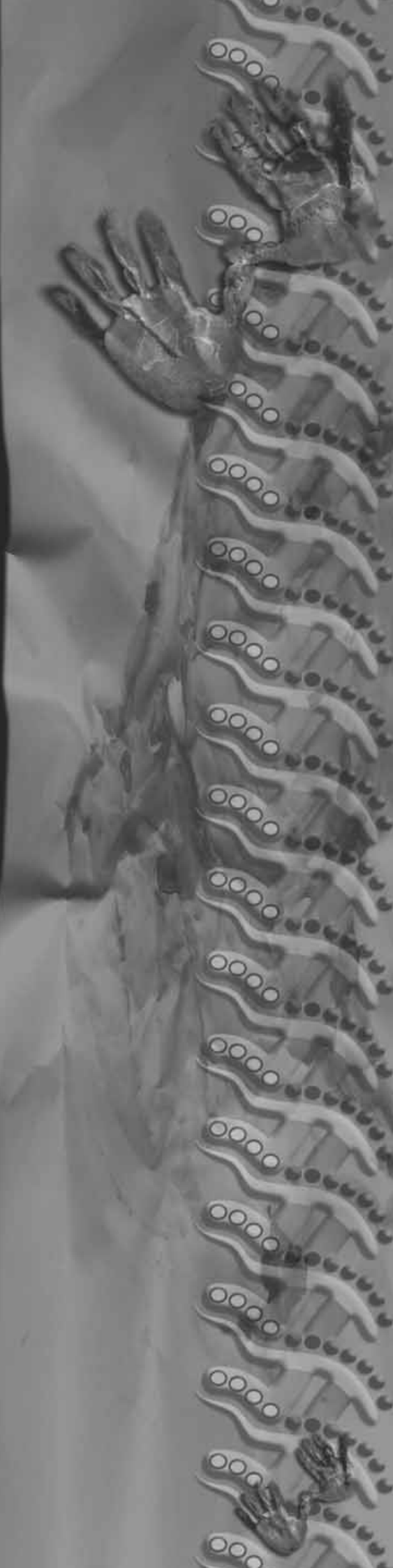




Northern
Territory
Government

Mathematics Number



Mathematics

Number

Outcome

Key Growth Point 1

Learners use intentional communication strategies to interact with people, objects and activities.

Learners demonstrating solid evidence of

N KGP 1 Number

- actively seek and anticipate interactions with familiar people, activities, objects and environments
- use a limited repertoire of gestures, actions and vocalisation strategies to respond to a sensory cue actively

KGP 2

Learners distinguish small collections by size. They recognise and repeat number words, distinguish number symbols from other symbols and understand that numbers are linked to the idea of 'amount'.

Indicators

Key Growth Point 1 has three distinct developmental stages organised into six levels. The Key Growth Points Continuum on page two (2) describes the earlier stages of this development, whilst the indicators below provide the curriculum scope for planning and assessing learning within **Key Growth Point 1**.

Level 5 Anticipate

- choose from a limited range of responses to seek attention, request and respond to people, materials, objects, activities, eg show excitement or protest when presented with familiar objects, activities, environments; reach out toward a familiar object
- explore materials and objects, eg reach out to explore the position of objects
- seek objects that may not exist in immediate environment, eg actively look for or request objects
- participate in shared activities with intermittent prompts and cues, eg copy some actions during number rhymes, songs and number games
- sustain concentration for short periods of time
- observe the results of their own actions with interest, eg notice changes in visual or auditory input as a result of touching an object
- remember learnt responses over more extended periods, eg return to or request favourite number games
- make simple choices, eg use a yes/no system when presented with one option or reach for preferred object when presented with two objects

Mathematics Key Growth Points Learning Continuum

Awareness	Engagement	Participation
<p>Level 1 Tolerate Learners allow themselves to be involved in an activity prompted by a familiar person. Learners are able to</p> <ul style="list-style-type: none"> • produce simple reflex responses in response to the sensations they are experiencing, eg vocalisation, eye rolling, actions in response to feeling pain • produce simple reflex responses in response to external stimuli, eg startle reflex to a loud noise • rely on communication partner to prompt interaction 	<p>Level 3 Respond Learners change their body language in a more sustained and consistent way. Learners are able to</p> <ul style="list-style-type: none"> • respond consistently to and show interest in familiar people, events and objects, eg point to known objects or people • react to new experiences, eg move towards an object, sound or movement source • accept and engage in co-active exploration of objects and environments, eg reach out and feel for objects as tactile cues to events 	<p>Level 5 Anticipate Learners use intentional communication strategies to interact with people, objects and activities. Learners are able to</p> <ul style="list-style-type: none"> • choose from a limited range of responses to seek attention, request and respond to people, materials, objects, activities, eg show excitement or protest when presented with familiar objects, activities, environments; reach out toward a familiar object • explore materials and objects, eg reach out to explore the position of objects • seek objects that may not exist in immediate environment, eg actively look for or request objects • participate in shared activities with intermittent prompts and cues, eg copy some actions during number rhymes, songs and number games • sustain concentration for short periods of time • observe the results of their own actions with interest, eg notice changes in visual or auditory input as a result of touching an object • remember learnt responses over more extended periods, eg return to or request favourite number games • make simple choices, eg use a yes/no system when presented with one option or reach for preferred object when presented with two objects
<p>Level 2 React Learners respond to a stimulus. Learners are able to</p> <ul style="list-style-type: none"> • take part in interactions, activities and experiences through body language, actions, vocalisations, eg attend briefly to lights, sounds or patterns of movement • intermittently appear alert and focus attention on certain people, objects or parts of objects, and experiences, eg focus on sensory aspects of stories or rhymes when prompted • give unexpected or intermittent reactions within an interaction, activity or experience, eg become excited in the midst of social activity 	<p>Level 4 Focus Learners respond purposefully to a stimulus. Learners are able to</p> <ul style="list-style-type: none"> • communicate consistent preferences and affective responses, eg reach out for favourite person • recognise familiar people, objects and experiences, eg recall an object that has been placed out of sight • perform actions by trial, error and improvement, eg hit a mathematical shape on a concept keyboard to make it appear 	<p>Level 6 Choose Learners request stimulus through gesture, action or vocalisation and are able to make a choice or express a preference. Learners are able to</p> <ul style="list-style-type: none"> • request interactions and activities with consistent use of gesture, actions or vocalisations, eg prompt another person to join in an activity • use learned responses over increasing periods of time to engage in activities and anticipate future events, eg indicate an area of the yard to go to • respond to options presented with actions, gestures and/or vocalisations clearly expressing their preference • attempt to solve problems systematically, eg bring an object to an adult in order to request a new activity • choose to select or reject from a number of presented options within and outside experiences, eg choose to taste new foods

Mathematics

Number

Outcome

Key Growth Point 2

KGP 1

Learners use intentional communication strategies to interact with people, objects and activities.

Learners distinguish small collections by size. They recognise and repeat number words, distinguish number symbols from other symbols and understand that numbers are linked to the idea of 'amount'.

Learners demonstrating solid evidence of

N KGP 2.1 Numbers and number systems

- sort, match and compare small collections of easily compared quantities by using 'bigger', 'smaller' and 'the same'
- begin to count forwards and backwards in the range 0 - 10
- distinguish spoken number words and symbols from other spoken words and symbols
- distribute items or portions in order to 'share'

N KGP 2.2 Calculating

- begin to 'count by ones' and use one-to-one correspondence with small collections of items

KGP 3

Learners match number words and symbols to collections. They count items, order and record small numbers. Learners represent or describe situations involving addition and subtraction by drawing, modelling or acting out. They create approximately equal groups by sharing.

Indicators

The curriculum scope for planning and assessing learning within **Key Growth Point 2**

Knowledge and skills

Numbers and number systems

- distinguish spoken numbers and written numerals from other spoken words or written symbols
- begin to state the name of displayed numerals to 10
- begin to count forwards in the range one to ten

Working mathematically

Numbers and number systems

- recognise numerals used in everyday life, eg telephone, television, clock, bus, house
- match numerals to everyday activities, eg tune to television Channel 2
- state or indicate their age in years
- use the display on a calculator to represent small numbers
- demonstrate how numbers are used in books, eg recognises numerals in simple picture books
- use or respond to language signifying quantity of collections or portions in everyday activities such as cooking, shopping, eg all, many, few, a lot, a little, bigger, smaller, same
- sort, match and count small collections of coins
- model how money is used to purchase goods through role play shopping, eg offers play money to simulate the exchange of goods for money

Indicators

The curriculum scope for planning and assessing learning within **Key Growth Point 2 (cont)**

Knowledge and skills

Working mathematically

Numbers and number systems (cont)

- match items to people, eg put out one cup for each person
- sing counting songs or say rhymes

Calculating

- use 'smaller', 'bigger' and 'the same' to describe differences between small collections of like items and between easily compared quantities, but may not necessarily be able to say how much bigger or smaller a collection or quantity may be
- apply one-to-one correspondence to match items to people
- distributes items or portions in order to 'share', although the sharing may not be 'equal or fair sharing' and some items or amounts may be left over

Key Mathematical Language	
counting numbers one, two, three... ten count, match big, bigger, small, smaller, same all, altogether	a lot, many, few, little money, coins, notes, dollars, cents share last, first

Mathematics

Number

Outcome

Key Growth Point 3

KGP 2

Learners distinguish small collections by size. They recognise and repeat number words, distinguish number symbols from other symbols and understand that numbers are linked to the idea of 'amount'.

Learners match number words and symbols to collections. They count items, order and record small numbers. Learners represent or describe situations involving addition and subtraction by drawing, modelling or acting out. They create approximately equal groups by sharing.

Learners demonstrating solid evidence of

N KGP 3.1 Numbers and number systems

- recognise and name numerals in the range 0 - 100
- recite forward and backward number name sequences to 100
- estimate, compare, order and represent the size of collections using small whole numbers
- represent and describe halves in pictures and words

N KGP 3.2 Calculating

- add and subtract a small collection of objects
- compare and describe collections of objects
- informally record addition, subtraction, grouping and sharing situations using stories, materials and pictures
- use sharing in one-to-one correspondence to divide a small collection into approximately equal groups.

Band 1

Learners describe, order and model whole numbers in a variety of ways. They investigate and represent situations involving the four operations using a number of different strategies including the use of manipulatives, stories and pictures.

Indicators

The curriculum scope for planning and assessing learning within **Key Growth Point 3**

Knowledge and skills

Numbers and number systems

- say, read and represent 1 and 2 digit numbers using numerals, words, symbols and objects to 100
- count with one-to-one correspondence
- count forwards and backwards to 30 giving the 'number after' and the 'number before'
- recognise collections to 6 by subitising
- estimate the number of items in a collection to 10

Working mathematically

Numbers and number systems

- count rhythmically to identify number patterns, eg stress counting every second number
- identify digital numerals on various displays, eg calculator, video/dvd player, microwave oven
- publish, present and read (oral, written or electronic) a number picture book
- identify and sort Australian notes and coins and is aware that notes and coins are worth different amounts
- know that money is used to purchase goods and that some items in a shop cost more than others
- use notes and coins in play situations to imitate buying goods

Indicators

The curriculum scope for planning and assessing learning within **Key Growth Point 3 (cont)**

Knowledge and skills	Working mathematically
Numbers and number systems (cont) <ul style="list-style-type: none"> compare and order written numbers and collections of objects using words or by physically manipulating them use ordinal numbers to indicate position in a sequence to ten, eg Jo came first, Matt came second and John came third use '10' as a reference point in forming numbers from 11 to 20, eg fourteen is ten and four uses 'tens' and 'ones' to model familiar two-digit numbers, eg MAB, ten strip, bundling popsticks 	Numbers and number systems (cont) <ul style="list-style-type: none"> know that goods cannot be purchased with insufficient money, and that if too much money is given then change can be expected use counting strategies to play simple board games
Calculating – addition and subtraction <ul style="list-style-type: none"> create, tell and record number combinations to 10, eg using a ten frame use mental imagery, materials or counting strategies to add and subtract small numbers model with manipulatives, solve and explain addition and subtraction calculations up to 20 record addition and subtraction using drawings, numerals and words add and subtract collections to represent small numbers in different ways 	Calculating – addition and subtraction <ul style="list-style-type: none"> mentally add and subtract small numbers generated from stories by visualising collections ask and answer number questions about stories, eg How many children were in the family? manipulate objects or act out a story problem to find a solution and record the solution, eg there were five crayons on the desk and one on the floor, how many crayons altogether? Draw a picture to tell the story create small number story problems, eg How many people in the group?
Calculating – multiplication and division <ul style="list-style-type: none"> use the term 'group' to describe a collection of items and 'sharing' to describe the distribution of a collection share manipulatives using one-to-one correspondence to form approximately equal groups count by ones to find the total number of objects organised in equal groups record grouping and sharing situations using pictures, numerals and words 	Calculating – multiplication and division <ul style="list-style-type: none"> use a calculator to count by adding one each time, beginning with 0 and pressing + 1 repeatedly, eg extend to add 2 investigate story problems involving grouping and sharing by drawing, making and acting

Indicators

The curriculum scope for planning and assessing learning within **Key Growth Point 3 (cont)**

Knowledge and skills	Working mathematically				
Fractions <ul style="list-style-type: none"> • share by dividing an object into two equal parts • recognise that halves are equal parts • recognise when two parts are not halves of a shape, object or collection • represent and record fractions (halves) of objects and collections using a variety of physical/pictorial techniques • recognise that the word half means one part of a two part equal share 	Fractions <ul style="list-style-type: none"> • use techniques such as paper-folding and equal sharing diagrams to solve problems based on everyday situations, eg equally share 1 muffin between 2 people • produce equal shares by cutting or pouring, eg share a small bottle of juice, cut a cake 				
<table border="1"> <thead> <tr> <th colspan="2" data-bbox="194 936 563 965">Key Mathematical Language</th></tr> </thead> <tbody> <tr> <td data-bbox="194 974 794 1256"> counting numbers 0 - 100 and especially teens counting by ones, counting on start counting from, count backwards from ordinal numbers (first to tenth) forwards, backwards, before, after ten frame combine – add, makes, join, and, get, plus separate – take away, how many more </td><td data-bbox="798 974 1394 1256"> How many altogether? How many are left? How many did I take away? group, make groups equal fair sharing, half, halves costs more, costs less, not enough money, too much money, change </td></tr> </tbody> </table>		Key Mathematical Language		counting numbers 0 - 100 and especially teens counting by ones, counting on start counting from, count backwards from ordinal numbers (first to tenth) forwards, backwards, before, after ten frame combine – add, makes, join, and, get, plus separate – take away, how many more	How many altogether? How many are left? How many did I take away? group, make groups equal fair sharing, half, halves costs more, costs less, not enough money, too much money, change
Key Mathematical Language					
counting numbers 0 - 100 and especially teens counting by ones, counting on start counting from, count backwards from ordinal numbers (first to tenth) forwards, backwards, before, after ten frame combine – add, makes, join, and, get, plus separate – take away, how many more	How many altogether? How many are left? How many did I take away? group, make groups equal fair sharing, half, halves costs more, costs less, not enough money, too much money, change				

Mathematics

Number

Outcome

Band 1

KGP 3

Learners match number words and symbols to collections. They count items, order and record small numbers. Learners represent or describe situations involving addition and subtraction by drawing, modelling or acting out. They create approximately equal groups by sharing.

Learners describe, order and model whole numbers in a variety of ways. They investigate and represent situations involving the four operations using a number of different strategies including the use of manipulatives, stories and pictures.

Learners demonstrating solid evidence of

N 1.1 Numbers and number systems

- recognise, name and count forwards and backwards by ones, twos, fives and tens from 1 and 2-digit numbers and beyond 100
- estimate, compare, order, read and represent numbers to 1 000
- round to nearest 10 in estimation
- represent and describe halves and quarters of an object or collection

N 1.2 Calculating

- mentally calculate addition and subtraction facts to 20 and some multiplication facts by using counting-on strategies
- represent addition and subtraction by writing number sentences and using partitioning to add and subtract two- and three-digit whole numbers
- use relationships between addition and subtraction to solve problems
- use equal grouping and counting for multiplication and division, involving multiples of 2, 5 and 10
- physically represent halves and quarters

Band 2

Learners use an emerging understanding of place value to describe, model and order whole numbers. They use efficient mental strategies to add and subtract, multiply and divide using equal grouping and counting.

Indicators

The curriculum scope for planning and assessing learning within **Band 1**

Knowledge and skills

Numbers and number systems

- say forward and backward number sequences by ones, tens and hundreds in the range 0 -1 000 and give 'number after' and 'number before' for any number in the range 0 - 100
- count forwards and backwards by 1s, 2s, 5s
- count forward and backwards by tens both on and off the decade
- count and represent large collections of objects by grouping in tens and hundreds, eg bundling a large quantity of drinking straws
- use place value to read, record and model two and three digit numbers recognising and stating the value of each digit
- recognise collection up to 12 by subitising

Working mathematically

Numbers and number systems

- investigate situations where whole numbers and money are used in real life situations
- explain that money includes more than coins and notes, eg recognise that credit cards, EFTPOS and cheques are also forms of money
- use money to buy (or simulate buying) basic goods and services
- compare the value of similar items, eg compare the price of different brands of bottled water
- investigate ways of changing numbers, eg add or subtract 10 from a whole number using the assistance of a calculator

Indicators

The curriculum scope for planning and assessing learning within **Band 1 (cont)**

Knowledge and skills	Working mathematically
<p>Numbers and number systems (cont)</p> <ul style="list-style-type: none"> use place value to order and compare two and three digit numbers estimate the size of collections up to 20 recall that there are 100 cents in a \$1 use the terms 'less than' and 'more than' to compare numbers round two-digit whole numbers to the nearest 10 when estimating <p>Calculating – addition and subtraction</p> <ul style="list-style-type: none"> efficient mental calculation strategies include: <p>Counting-on from the larger number to find the sum of two numbers</p> <p>Counting-back from a number to find the number remaining</p> <p>Compensation, eg if $8 + 2 = 10$ then $7 + 3 = 10$ or if $10 - 3 = 7$ then $9 - 2 = 7$</p> <p>Commutativity, eg understand that $2 + 9 = 9 + 2$</p> <p>Use addition for subtraction (inverse operations), eg understand that if $6 + 3 = 9$ then $9 - 3 = 6$, or $22 - 14 = _$ can be reworked as $14 + _ = 22$ and $14 + (6 + 2) = 22$</p> <p>Use doubles and near doubles, eg $4 + 5$, know that 5 and 5 is 10, so one less is 9; $5 + 7$, double 5 and add 2; $25 + 25 = _$ so $26 + 27 = _$</p> <p>Use a known fact, eg to solve $5 + 3$, know that $4 + 3 = 7$, so $5 + 3$ must be 8; recall the multiples of 10 that add to 100, eg 40 and 60</p> <p>Partition using 5 as a base, eg to solve $4 + 3$, make 5 by partitioning the 3 into a 1 and a 2, to $5 + 2$ (equals 7)</p> <p>Partition using 10 as a base, eg to solve $7 + 6$, make 10 by partitioning 6 into $3 + 3$, to make $10 + 3$</p> 	<p>Numbers and number systems (cont)</p> <ul style="list-style-type: none"> place numbers, including 0, on a number line and explain reasoning, eg say why 70 is placed on the number line between 50 and 100, but closer to 50 <p>Calculating – addition and subtraction</p> <ul style="list-style-type: none"> use a calculator to add and subtract numbers read amounts of money and make up the amount with coins or notes in different ways, eg make up a set of coins to the value of \$5, make \$25 using notes, how many ways can 75c be made? use technology to explore strategies used in adding and subtracting numbers, eg the effect of adding a specified number to a series of numbers interpret problem solving situations and express them mathematically based around a single operation, eg decide which operation is required and represent them in manipulatives, drawings, number sentences, technology or a combination of these describe and compare methods for solving problems, eg use guess and check to find missing numbers in number sentences and explain why addition and subtraction are inverse operations by drawing diagrams

Indicators

The curriculum scope for planning and assessing learning within **Band 1 (cont)**

Knowledge and skills	Working mathematically
<p>Calculating – Addition and Subtraction (cont)</p> <p>Use 10s structure of teens, eg to solve $15 - 6$, know that $15 - 5 = 10$ so the answer is one less than this (9)</p> <p>Jump strategy build on one number by partitioning the second number, eg $28 + 13 = 28 + 10 + 3 = 41$</p> <p>Split strategy separating tens from ones and add or subtract each separately before combining</p> <ul style="list-style-type: none"> describe addition as the sum of two or more numbers and subtraction as the difference between two numbers represent addition and subtraction in a variety of ways including models, drawings, numbers, symbols, words use efficient strategies to mentally add and subtract with single digits and multiples of 10, eg $2 + 2 = 4$ so $20 + 20 = 40$ use supported strategies to solve 2 digit addition and subtraction, eg number lines, 100 charts, MAB record number sentences using numerals and symbols including the use of +, - and = sort, order and count coins and notes in multiples of 5c, 10c, 20c, 50c, \$1, \$2, \$5, \$10, \$20, \$50 and \$100 and record total amounts <p>Calculating – multiplication and division</p> <ul style="list-style-type: none"> use counting as a strategy to produce equivalent collections and compare collections use supported strategies to solve single digit multiplication, eg 100 charts, number lines, arrays, models and drawings use skip or rhythmic counting by 2s, 5s and 10s to solve single digit multiplication solve division problems by using equal sharing by 2s, 5s and 10s 	<p>Calculating – addition and subtraction (cont)</p> <ul style="list-style-type: none"> use calculators to add and subtract numbers up to two-digits, including verifying the result of an estimate and interpreting a calculator display investigate various ways of representing a problem, eg draw a diagram, describe in words, make a model, act it out interpret number sentences to 20 and describe them in own words, eg $_ + 2 = 12$, 'what number do I add to get 12?' <p>Calculating – multiplication and division</p> <ul style="list-style-type: none"> use arrays to solve single digit multiplication and explain how these also relate to division use materials and diagrams to represent multiplication and division stories, eg create or draw an array accurately or use rhythmic (stress) or skip counting to determine the total number of elements in a given array write stories to represent operations expressed symbolically, eg three people each had 5 books, 3×5

Indicators

The curriculum scope for planning and assessing learning within **Band 1 (cont)**

Knowledge and skills	Working mathematically
Calculating – multiplication and division (cont) <ul style="list-style-type: none"> use repeated addition or subtraction to solve multiplication and division problems, eg $4 \times 5 = 5 + 5 + 5 + 5$ recall doubles facts to 20 use the group structure to count manipulatives, eg obtain a total with groups of 3 by using rhythmic or stress counting; 1, 2, 3, 4, 5, 6, 7, 8, 9 or skip counting; 3, 6, 9... use arrays to describe the commutative property to determine turn around facts, eg $4 \times 6 = 6 \times 4$ recall the multiplication and division facts for the multiples of 2, 5 and 10; recall or calculate some multiples of 3, 4 and 5 record single digit multiplication and division calculations using diagrams and equations including the use of symbols \times, \div and $=$ 	Calculating – multiplication and division (cont) <ul style="list-style-type: none"> use technology to explore strategies to calculate simple multiplication and division situations, eg use a calculator to 'skip count' rows of items in an array to determine a total
Fractions <ul style="list-style-type: none"> recognise and represent halves and quarters using collections of objects, eg share a collection into two or four 'equal shares' identify words for halves and quarters recognise and represent halves and quarters of a whole object, eg share a pizza with 2 people, then with 4 people 	Fractions <ul style="list-style-type: none"> identify fractions used in everyday situations, eg reading a clock to the half hour, time divisions in a game such as half time, share food or drink use techniques such as paper-folding, equal sharing diagrams and folding number lines to solve problems based on everyday situations use halving based on symmetry to partition continuous quantities into four parts, eg equally share a cake or chocolate bar between people
Key Mathematical Language	
counting numbers 0 – 1 000, ordinals to 100th count on, count back, count down combine, add, separate, subtract, take away, minus, numbers that add up to, different number sentence, number line equal to, less than, more or greater than big, bigger, biggest, small, smaller, smallest, large, larger, largest double sum calculate digit	difference halves, quarters fraction, sharing, grouping multiply, times, rows of, groups of, arrays skip count, by ones, twos, threes etc estimate and check odd, even round types of money apart from notes and coins: credit card, cheque, EFTPOS between

Mathematics

Number

Outcome

Band 2

Band 1

Learners describe, order and model whole numbers in a variety of ways. They investigate and represent situations involving the four operations using a number of different strategies including the use of manipulatives, stories and pictures.

Learners use an emerging understanding of place value to describe, model and order whole numbers. They use efficient mental strategies to add and subtract, multiply and divide using equal grouping and counting.

Learners demonstrating solid evidence of

N 2.1 Numbers and number systems

- count forwards and backwards by 10s and 100s on and off the decade
- estimate, compare, order, read and represent numbers up to five-digits
- round to the nearest 10, 100 and 1 000 in estimation
- compare, order, and represent commonly used fractions
- separate and rearrange collections and objects in a variety of ways to show equal parts
- determine equivalence between commonly used fractions

N 2.2 Calculating

- recall basic addition and subtraction facts to 20
- use mental strategies to calculate multiplication facts to 10×10
- use a range of mental strategies to add and subtract numbers up to two-digits
- add and subtract whole numbers to thousands and decimals with money
- add and subtract simple fractions expressed in words
- use informal written strategies for multiplying and dividing a two- and three-digit by a one-digit number
- use the relationship between multiplication and division to solve simple problems
- estimate both sums and products by rounding to a single digit or multiples of ten

Band 3

Learners describe and manipulate whole numbers and decimals, demonstrating knowledge of place value. They recognise that the relationship between multiplication and division is based on equal partitioning and can apply strategies to multiplication and division as well as visualise and manipulate fractions, decimals, key percentages and simple ratios.

Indicators

The curriculum scope for planning and assessing learning within **Band 2**

Knowledge and skills

Numbers and number systems

- read, say, write, model and compare and order different representations of whole numbers to five-digits, eg numerals, expanded notation, words, objects and digital displays
- identify the number before and after a given number (to five-digit numbers)
- count forwards and backwards by either 10s or 100s, starting from any number in the range 1 to 1 000

Working mathematically

Numbers and number systems

- identify and compare large numbers used in everyday situations, eg height of mountains, populations
- order events in real life situations, eg determine first, second and third place in long jump by the measurements
- investigate money amounts to determine the smallest number of notes and coins required to make a given amount

Indicators

The curriculum scope for planning and assessing learning within **Band 2 (cont)**

Knowledge and skills	Working mathematically
Numbers and number systems (cont) <ul style="list-style-type: none"> use the decimal point in representing money find out how many 10s, 100s and 1 000s are in a whole number, eg 142 has 14 tens state the place value of digits (10s, 100s, 1 000s) in any given number to five-digits, including recognising the role of zero round whole numbers to the nearest 10, 100 or 1 000 when estimating estimate sums and products of money by rounding to the nearest dollar, eg the cups cost \$4.95 so \$30 will be enough to buy six use $<$, $>$, $=$ and \neq symbols to show relationships between two numbers 	Numbers and number systems (cont) <ul style="list-style-type: none"> explain that money can be more than notes and coins and understand that there are different forms of income, eg money earned in wages/salaries, government payments, prizes and gifts, interest on savings explain that money can be borrowed at a cost, eg credit card, personal loan accurately interpret and complete simple financial forms, eg bank deposit slips, savings bank statements, shopping docket
Calculating – addition and subtraction <ul style="list-style-type: none"> continue use of efficient mental strategies as indicated in Band 1 with increased automaticity use efficient strategies to mentally add and subtract pairs of numbers to two-digits mentally add and subtract money amounts, eg $\\$1.25 + \\0.25 add and subtract numbers of up to four-digits using both formal and informal written strategies add and subtract money amounts to the cent using formal and informal written strategies make reasonable mental estimates to calculations involving single operations, eg $45 + 7 + 190$ is about $50 + 200$ or 250 	Calculating – addition and subtraction <ul style="list-style-type: none"> describe and record strategies for adding and subtracting using everyday language and diagrams, eg explain how to subtract 17 from 132 using a number line or MAB solve a range of problems using problem-solving strategies such as trial and error, drawing a diagram or number line, working backwards, looking for patterns, using a table critically examine strategies used to solve problems and determine whether the strategy could be improved make and test simple conjectures and explain the approach taken and the conclusions reached, eg addition of two odd numbers always results in an even sum
Calculating – multiplication and division <ul style="list-style-type: none"> use efficient mental strategies to multiply up to 10×10, as well as multiply two-digit numbers by 2, 3, 4, 5 and 10 	Calculating – multiplication and division <ul style="list-style-type: none"> use materials and technology to represent and explore whole numbers and describe place value changes as numbers are multiplied and divided by 10 and 100 use a calculator efficiently for multiplication and division of whole numbers and money expressed in decimals

Indicators

The curriculum scope for planning and assessing learning within **Band 2 (cont)**

Knowledge and skills	Working mathematically
Calculating – multiplication and division (cont) <ul style="list-style-type: none"> - efficient mental strategies to multiply include: <ul style="list-style-type: none"> doubles knowledge for $\times 2$ doubles plus 'one more lot' for $\times 3$ double doubles for $\times 4$ skip counting compensation, eg $14 \times 4 = 15 \times 4 - 4$ associative property, eg $22 \times 4 = 22 \times 2 \times 2$ distributive property, eg $45 \times 6 = (40 + 5) \times 6 = (40 \times 6) + (5 \times 6)$ uses known multiplication facts to derive answers to unknown multiplication problems, eg use times five facts to work out times six, seven and four facts, eg $2 \times 5 = _$ so $2 \times 6 = _$ so $2 \times 7 = _$ commutative property to make a multiplication problem easier, eg $25 \times 3 = 3 \times 25$ count 10s as units, eg if 8×7 is 56, then 8×70 is 56 tens which is 560 doubling the multiplicand doubles the answer, eg $23 \times 4 = 2$ lots of 23×2 where 4 is multiplicand • Use efficient mental strategies to divide two-digit multiples of 2, 3, 4, 5 and 10 by their factors - efficient mental strategies to divide include: <ul style="list-style-type: none"> halving for $\div 2$ halving and halving again for $\div 4$ halving the divisor, doubles the answer, eg $72 \div 4 = \text{half of } 72 \div 2$ halving both the dividend and the divisor gives the same answer, eg $52 \div 4 = 26 \div 2$ skip counting distributive property, eg $48 \div 2 = (40 + 8) \div 2 = (40 \div 2) + (8 \div 2)$ inverse operations, eg $66 \div 3$ can be found by realising that $20 \times 3 = 60$ and $2 \times 3 = 6$ so $66 \div 3 = 22$ count 10s as units, eg if $8 \div 2$ is 4, then $80 \div 2$ is 4 tens which is 40 • multiply two and three-digit numbers by single digit numbers using both formal and informal written methods • divide two- and three-digit numbers by single digit numbers using both formal and informal written methods and state the remainder • skip count by any single digit and 10s 	Calculating – multiplication and division (cont) <ul style="list-style-type: none"> • choose and apply strategies suited to the mathematical structure of various problems and investigations, eg use a hundreds board to identify all whole numbers to 100 that have a remainder of 1 when divided by 4 • use the constant function on a calculator to multiply and divide whole numbers and see whether a pattern results • read and interpret practical problems, identify appropriate operations to use, express them mathematically (using symbols) and solve them, eg read a word problem, recognise the operation needed and use a suitable strategy to solve it • make and test statements about relationships using technology and report on process and results, eg test the statement that any number can be divided by 5 by doubling it and dividing it by 10 • determine square numbers using manipulatives, pictures and diagrams • restate multiplication and division word problems or stories in symbols including the use of \times (multiply) and \div (divide) • apply and explain own methods to multiply and divide whole numbers to three-digits by single digit numbers • use technology and written methods to explore whole numbers by listing all their factors • record the results of mental calculation using multiplication and division diagrams, words and equations • investigate arrays to determine and report on the connection between multiplication and division

Indicators

The curriculum scope for planning and assessing learning within **Band 2 (cont)**

Knowledge and skills

Working mathematically

Calculating – Multiplication and Division (cont)

- match single digit multiplication equations with their inverse division equations and state the relationship in everyday language, eg '3 groups of 5 makes 15, 15 shared by 3 gives 5 each'
- estimate the result of multiplication problems by rounding to the nearest 10, eg
84 x 3 is about 80 x 3 which is 240
- multiply numbers by 100s and 1 000s up to a total of 10 000

Fractions

- create and name halves, quarters, thirds, fifths and tenths by subdividing a given whole, eg sharing out a collection of objects equally, or folding a paper shape to make equal areas
- order and compare familiar fractions using manipulatives or visual representations, eg cuisenaire rods, number lines
- determine the unit fraction of a collection when expressed in words, eg half of sixteen is eight
- count forwards and backwards by halves, quarters, thirds, fifths and tenths, eg one third, two thirds, three thirds, one and one third
- interpret symbolic representations of fractions for $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$ and $\frac{1}{10}$
- determine (using manipulatives or paper folding) and record simple fractional equivalences in words, eg two quarters equals one half
- use supported strategies to perform simple addition and subtraction tasks on fractions, eg find a half plus a quarter by cutting and reforming paper circles, by using a number line, by creating a fraction wall
- state what the numerator and denominator mean in numerical representations of fractions, eg 'the bottom number says how many parts in the whole, the top number says how many of those parts we have'
- mentally add simple fractions with like denominators expressed in words, eg one third plus one third is two thirds

Fractions

- use fractions to solve everyday problems, eg share 3 pikelets between 4 people
- use basic division facts to find a unit fraction of a whole-number multiple in a practical situation, eg there are 28 jellybeans and I will get one quarter. How many beans will I get?
- order familiar unit fractions and explain why they are larger or smaller, eg which is bigger and why
- create visual representations to explore the idea that as fractions become smaller more of them are required to make one whole, eg fraction wall

Indicators

The curriculum scope for planning and assessing learning within **Band 2 (cont)**

Key Mathematical Language	
compare, order ascending, descending, differences, lower, higher	rows, columns, arrays
place value - ones, tens, hundreds, thousands, tens of thousands, tenths, hundredths	number line
rounding	re-name, remainder
estimate	equals, not equals/unequal, greater than, less than (symbols)
increase, decrease	money - income, bank account, wage, salary, payment, interest, bank statement, deposit, withdrawal, borrow, loan
divide	
addition, sum, total and subtraction, difference	

Mathematics

Number

Outcome

Band 3

Band 2

Learners use an emerging understanding of place value to describe, model and order whole numbers. They use efficient mental strategies to add and subtract, multiply and divide using equal grouping and counting.

Learners describe and manipulate whole numbers and decimals, demonstrating knowledge of place value. They recognise that the relationship between multiplication and division is based on equal partitioning and can apply strategies to multiplication and division as well as visualise and manipulate fractions, decimals, key percentages and simple ratios.

Learners demonstrating solid evidence of

N 3.1 Numbers and number systems

- order, read and represent whole numbers in the millions
- round decimals to the nearest whole number to assist with estimation
- order, represent and manipulate decimals, simple fractions and common percentages
- find equivalence between fractions including expressing a mixed number as an improper fraction
- equate common percentage to fractions and decimals
- round decimal numbers to a given place when estimating
- use ratio to describe relationships between quantities
- identify prime numbers

N 3.2 Calculating

- mentally calculate addition and subtraction facts to 100, recall multiplication facts to 10 x 10 and derive related division facts
- use a range of mental or written strategies to add and subtract numbers of any size including decimal fractions
- mentally multiply two-digit numbers by single digit numbers and divide two-digit numbers by factors and multiples of 10
- use a range of mental and written strategies to multiply and divide whole numbers by one- and two-digit whole numbers and decimal numbers by one-digit whole numbers and by 10, 100 and 1 000
- add and subtract fractions and multiply familiar fractions by a whole number
- calculate common percentages of a quantity

Band 4

Learners extend knowledge of place value and multiplicative strategies to whole numbers and fractional numbers and compare and manipulate a wide variety of decimals, common fractions, percentages and ratios. They order and manipulate integers and apply an emerging understanding of the inverse relationship between powers and roots.

Indicators

The curriculum scope for planning and assessing learning within **Band 3**

Knowledge and skills

Numbers and number systems

- read, write and say whole numbers to millions
- count forwards and backwards by ones, tens, hundreds and thousands up to seven-digits beginning at any number, eg 219, 319, 419

Working mathematically

Numbers and number systems

- investigate number patterns created when counting backwards on a calculator, noting negative numbers, eg enter - 5 repeatedly
- read and interpret scales that involve positive and negative numbers, eg a thermometer

Indicators

The curriculum scope for planning and assessing learning within **Band 3 (cont)**

Knowledge and skills	Working mathematically
Numbers and number systems (cont) <ul style="list-style-type: none"> record numbers up to seven-digits using expanded notation and state how many 10s, 100s, 1 000s and 10 000s compare and order whole numbers to millions recognise the location of negative numbers in relation to zero on a number line or scale use the symbols $<$, $>$, $=$ and \neq to state relationships between quantities round numbers to the nearest whole number, ten, hundred or thousand identify prime numbers to 20 	Numbers and number systems (cont) <ul style="list-style-type: none"> recognise different abbreviations of numbers and number systems used in everyday contexts, eg $\\$1k = \\$1\ 000$, V is the Roman numeral for 5 identify and describe different forms of money and how money can be earned, borrowed and spent including personal loans, home loans and higher purchase agreements explore how different forms of number representations are used in a given context and discuss their strengths and limitations, eg why are written numbers used on personal cheques? use technology to investigate what happens when numbers are multiplied or divided by 10, 100, 1 000 recognise and use whole numbers, decimals and fractions in everyday, practical situations, eg explain when the third quarter in a game of football will occur, work out if the third quarter of the game goes for 20 minutes, the whole game should go for 80 minutes investigate prime numbers to 100 using supported structures, eg using 100 charts. enter, read and interpret amounts of money on a calculator interpreting decimal displays to the nearest cent round money in the context of purchasing items, including determining 'rounding advantages' when making purchases
Calculating – addition and subtraction <ul style="list-style-type: none"> continue use of efficient mental strategies as indicated in Band 1 with increased automaticity use efficient strategies to mentally add or subtract two-digit numbers and beyond where appropriate, eg $92-34$, $105-26$, $264-99$ use place value routinely to partition whole numbers when adding and subtracting, eg $73 - 46$ as $73 - 40 = 33$, $33 - 6 = 27$ add and subtract whole numbers of any size using both formal and informal written methods 	Calculating – addition and subtraction <ul style="list-style-type: none"> explain reasoning used to establish the truth of a proposition, eg show that the sum of two even numbers or the sum of two odd numbers is always an even number check and explain the reasonableness of calculations with respect to the original situation or problem, eg check mental or written calculations by doing them again, by making an estimate using an inverse operation, or by calculator

Indicators

The curriculum scope for planning and assessing learning within **Band 3 (cont)**

Knowledge and skills	Working mathematically
Calculating – multiplication and division <ul style="list-style-type: none"> continue use of efficient mental strategies as indicated in Band 2 with increased automaticity recalls all multiplication to 10 x 10 facts and derives their inverses, eg 8×7, 7×8, $56 \div 8 = 7$, $56 \div 7 = 8$ recall square numbers to 100 use efficient strategies to mentally multiply two-digit numbers by single digit numbers and by two-digit multiples of 10, particularly the distributive property strategy use efficient strategies to mentally divide two-digit numbers and three-digit multiples of 10 by single digit factors use both formal and informal written methods to multiply three-digit by two-digit numbers use both formal and informal written methods to divide two- and three-digit numbers by single digit numbers expressing the remainder in fractional form apply order of operations conventions to solve equations with multiple operators and brackets, eg $3 + 6 \times (5 + 4) \div 3 - 7$ apply knowledge of number relationships to compare the relative size of expressions, eg use $<$, $>$, \neq or $=$ in this sentence 263×5 ___ 120×10 identify and list factors and multiples, eg list the first six multiples of 15, list all the factors of 12 	Calculating – multiplication and division <ul style="list-style-type: none"> efficiently use a calculator to solve problems involving whole numbers and decimals, including where more than one operation is needed and interpret displays, eg $37 \div 3$ to answer 3 children in a family shared \$37, how much did each receive? justify the selection of a range of goods and services, eg examine comparative costs when purchasing goods and services, evaluate and recommend value for money purchases develop simple budgets and financial records, eg develop a budget that takes account of particular needs and wants and established priorities such as a budget for a family meal or outing use technology such as calculators (using memory function) or spreadsheets to carry out more complex or repetitive computations with attention to order of operation, eg $(2.75 \times 35) + (0.54 \times 27)$ interpret word problems to select and use an appropriate sequence of operations and apply suitable methods of computation form estimates and make approximations arising from practical situations involving calculations with whole numbers, decimals and fractions and interpret and justify their reasoning in context, eg total of a shopping bill explore the possible truth of propositions using technology where appropriate, eg investigate when the sum of two numbers is less than their product multiply and divide numbers by 10 and 100 mentally and using technology, and describe the changes using models such as a place value chart, eg use a calculator to repeatedly multiply 1.5 by 10, record each change on a place value chart and describe the pattern of changes
Fractions, Decimals, Percentages <ul style="list-style-type: none"> compare and order common fractions and decimals to three places using supported strategies, eg a number line or scale read, write and manipulate decimal fractions to thousandths 	Fractions, Decimals, Percentages <ul style="list-style-type: none"> explain with practical examples why money and measures use decimal notation use judgements of length to estimate the position of fractions on a number line, eg estimate to locate $\frac{4}{5}$ on an unpartitioned 0 - 1 number line

Indicators

The curriculum scope for planning and assessing learning within **Band 3 (cont)**

Knowledge and skills	Working mathematically
Fractions, Decimals, Percentages (cont) <ul style="list-style-type: none"> order decimal numbers up to thousandths including those with unequal numbers of places use supported strategies to determine equivalences between commonly used percentages, decimals and fractions, eg use 0 - 1 number lines use supported strategies to compare and order common fractions including improper fractions, eg use number lines, partition diagrams use division to rename improper fractions as mixed numbers recall and represent the decimal equivalents for simple common fractions $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{8}$, $\frac{1}{10}$ round decimal fractions to the nearest whole number, tenth or hundredth use mental strategies to <ul style="list-style-type: none"> add and subtract decimal fractions with one or two decimal places, eg $0.3 + 0.7$ add and subtract halves and quarters, eg $\frac{1}{2} + \frac{1}{4}$, $\frac{3}{4} - \frac{1}{2}$, $1\frac{1}{4} - \frac{1}{2}$ add and subtract fractions with common denominators eg $\frac{2}{7} + \frac{3}{7}$ subtract a unit fraction from one, eg $1 - \frac{1}{3}$ use supported, mental or written strategies to add and subtract fractions with readily identifiable common denominators, eg $\frac{3}{4} + \frac{5}{8} = \frac{6}{8} + \frac{5}{8} = \frac{11}{8}$ add and subtract decimals with different numbers of decimal places (to thousandths) using a range of mental and written strategies with attention to place value, eg $5 - 2.25$; $0.375 + 1.625$; $5.2 - 1.68$ understand that fractions, decimals and percentages are different ways of representing division, eg $4 \div 5$ is the same as $\frac{4}{5}$ solve problems involving simple ratios with whole numbers and money, eg if 2 drinks cost \$5, how many drinks can you purchase for \$10? 	Fractions, Decimals, Percentages (cont) <ul style="list-style-type: none"> use materials and diagrams to represent fractional amounts in practical situations where the 'whole' may be an object, quantity or collection, eg fold tape into five equal parts and shade three parts to show $\frac{3}{5}$, or find $\frac{3}{5}$ of a collection of objects solve problems involving fractions and division, eg if 3 identical pizzas are shared fairly among 4 people, list the fraction/s each person would receive explain that fractions are relative to a particular whole, eg explain that one quarter of the family size pizza is more than half of the small pizza order fractions using equivalence and approximations and justify, eg $\frac{2}{5}$ is less than $\frac{7}{16}$ because $\frac{2}{5}$ is $\frac{1}{10}$ less than $\frac{1}{2}$ and $\frac{7}{16}$ is $\frac{1}{16}$ less than $\frac{1}{2}$ using a 0 - 1 number line with 20 divisions investigate equivalence between fractions, decimals and percentages by labelling each division using all three conventions use partition diagrams to investigate equivalence of fractions by repeatedly sub dividing each division into equal parts, eg fraction wall, fraction bridge

Indicators

The curriculum scope for planning and assessing learning within **Band 3 (cont)**

Fractions, Decimals, Percentages (cont)

- apply efficient division strategies to mentally multiply unit fractions by two-digit numbers and three-digit multiples of 10
- use supported strategies to multiply whole numbers by familiar fractions
- mentally determine common percentages of two-digit numbers and three-digit multiples of 10 by first converting the percentages to unit fractions, eg 25% of 80 = $\frac{1}{4}$ of 80

Key Mathematical Language	
doubling, halving, thirding, trebling percentage, percent positive/negative number equivalent fraction, mixed number, improper fraction, numerator, denominator factor, prime factor, multiple, square number ratio, 'two for one' expanded notation, rule of order, brackets	ascending/increasing, descending/decreasing Hindu-Arabic numerals, Roman numerals number line/scale power of ten multiplication/product, division/quotient calculator functions; memory facility finance - income, expenditure, profit, loss, tax, GST, budget, spreadsheet

Mathematics

Number

Outcome

Band 4

Band 3

Learners describe and manipulate whole numbers and decimals, demonstrating knowledge of place value. They recognise that the relationship between multiplication and division is based on equal partitioning and can apply strategies to multiplication and division as well as visualise and manipulate fractions, decimals, key percentages and simple ratios.

Learners extend knowledge of place value and multiplicative strategies to whole numbers and fractional numbers and compare and manipulate a wide variety of decimals, common fractions, percentages and ratios. They order and manipulate integers and apply an emerging understanding of the inverse relationship between powers and roots.

Learners demonstrating solid evidence of

N 4.1 Numbers and number systems

- demonstrate understanding of system place value
- order or determine the equivalence of fractions, decimals and percentages
- interpret, represent and calculate using ratios and rates
- determine squares and cubes and their related roots and represent these using index notation.

N 4.2 Calculating

- use efficient mental, written and technological strategies to calculate using all 4 operations with integers, fractions, decimals and mixed numbers
- express a number as a product of its prime factors
- apply and manipulate ratios and rates to solve problems
- use effective estimation strategies including rounding in context and solve problems where exact calculations are not required

Band 5

Learners combine system knowledge of place value with formal notation to represent order and manipulate numbers of any size; accordingly they use scientific notation, read and represent recurring decimals and specify and respect significant figures and degrees of accuracy.

Indicators

The curriculum scope for planning and assessing learning within **Band 4**

Knowledge and skills

Numbers and number systems

- compare and order whole numbers, decimal numbers, integers, common fractions and percentages
- use index notation to represent powers of numbers, eg $8 = 2^3$
- use notation for square roots $\sqrt{\quad}$ and cube roots $\sqrt[3]{\quad}$
- recognise the relationship between squares and square roots, cubes and cube roots
- use index notation to represent composites as a product of their prime factors, eg $24 = 2^3 \times 3$
- estimate and then calculate square roots and cube roots using a calculator

Working mathematically

Numbers and number systems

- order and compare integers in real life contexts, eg measurements such as temperatures around the world, altitude above or below sea level, time lines
- use whole number powers and square roots in solving problems, eg measurement problems involving the calculation of area and volume
- read, interpret and round decimal places displayed on a calculator
- investigate propositions, hypotheses and conjectures, eg every natural number is the sum of two prime numbers

Indicators

The curriculum scope for planning and assessing learning within **Band 4 (cont)**

Knowledge and skills	Working mathematically
Numbers and number systems (cont) <ul style="list-style-type: none"> use a number line to compare and order negative integers use symbol for approximation, ie \approx 	Numbers and number systems (cont) <ul style="list-style-type: none"> explain the use of the decimal point in the place value system demonstrate understanding of system place value by investigating and comparing other number systems, eg Roman, Egyptian, Babylonian, Indigenous identify and describe features of specific groups of numbers, eg Fibonacci, Pascal's triangle, Palindromic numbers
Calculating – addition and subtraction <ul style="list-style-type: none"> use supported written and mental strategies to add and subtract integers, eg use a number line to scaffold understanding 	Calculating – addition and subtraction <ul style="list-style-type: none"> solve problems involving addition and subtraction of integers, eg show that an overnight change in temperature in Alice Springs from 15°C to -2°C is a drop of 17°C, show how a bank account may increase and decrease in available funds depending on deposits and withdrawals, the amount left to be paid off at a given time on a loan based on a recent statement from the bank
Calculating – multiplication and division <ul style="list-style-type: none"> continue use of efficient mental strategies as indicated in Band 2 with increased automaticity use efficient mental strategies to multiply and divide two- and three-digit numbers by a single digit, eg $343 \div 7$ calculate and recall simple powers and square roots to 10, eg $5^3 = 5 \times 5 \times 5 = 125$, $\sqrt{4} = 2$, and use written or technological methods for more difficult cases multiply or divide by the power of 10, eg $4.57 \times 100 = 457$; $6.3 \div 100 = 0.063$ multiply and divide positive and negative integers use mental strategies or formal and informal written methods to multiply and divide two- and three-digit numbers by two-digit numbers solve division problems that have remainders and express remainders as fractions or decimals appropriate to the context 	Calculating – multiplication and division <ul style="list-style-type: none"> use multiplication in calculating amounts from similar and familiar rates such as unit price make deductions and prove statements, eg prove that if two numbers differing by 2 are multiplied and 1 added, then the result is always a perfect square use technology to explore pattern and structure, and general representations, eg investigate the set of prime numbers and the validity of some possible 'rules' for generating prime numbers use estimation to check the answers to multiplication and division problems investigate and apply tests of divisibility recognise the need to divide where the divisor is a decimal greater than one or less than one, eg how many 1.75 litre containers can be filled from a 40 litre container; or how many pieces of 0.4 m long can be cut from 10m of fabric?

Indicators

The curriculum scope for planning and assessing learning within **Band 4 (cont)**

Knowledge and skills	Working mathematically
Fractions, Decimals, Percentages, Ratio <ul style="list-style-type: none"> convert improper fractions to mixed numbers and mixed numbers to improper fractions find equivalent fractions and rewrite fractions in simplest form add, subtract, multiply and divide fractions and mixed numbers using mental and written strategies subtract fractions from whole numbers using mental and written strategies find highest common factors and lowest common denominators in order to add, subtract and simplify fractions and to simplify ratios convert between fractions, decimals and percentages, representing or rounding percentages and recurring decimals as appropriate to the context express recurring decimals using formal notation determine fractions and percentages of quantities including money amounts (including percentages of greater than 100%) express numerical increases as a percentage, eg Australia's population grew from 19 533 972 in 2001 to 21 180 632 in 2007, express this growth as a percentage of the 2001 figure increase or decrease a quantity by a given percentage, eg calculate the new amount if \$70 000 is increased by 2.5% compare and order fractions, decimals and percentages and represent comparisons using symbols for equality and inequality, ie $<$, $>$, $=$, \neq apply ratios to represent relative quantities, eg state that rice and water are mixed in a 2:3 ratio express a quantity as a given ratio with up to 3 elements, eg distribute \$1 000 in a 2:3:5 ratio express elements of ratios as fractions of the whole, eg determine that a drink is $\frac{1}{5}$ cordial if it consists of cordial mixed with water in a 1:4 ratio 	Fractions, Decimals, Percentages, Ratio <ul style="list-style-type: none"> compare and order common fractions, decimal numbers and percentages for practical purposes including money and measurement, eg camera shutter speeds, length of nails and diameter of bolts; fluctuations in daily interest rates; performance of athletes and sport teams use percent to solve real life problems, eg GST on \$156 is \$15.60 which gives a total of \$171.60 use a range of mental and written strategies to interpret and solve multi-step problems that involve a combination of operations, eg How many pieces 0.4 metre long can be cut from 8 metres of fabric? understand and explain the use of credit, eg analyse and describe with examples the use of credit and associated interest; evaluate mobile phone contracts or ICT bundles evaluate the relationship between spending and using credit responsibly, eg taking account of factors such as debt levels and essential expenses when deciding a reasonable credit limit prepare simple personal and family budgets and records, eg identify fixed and variable expenses, calculate interest and repayments and use ICT to keep financial records such as the use of spreadsheets and simple internet tools; plan a room make-over given a budget; prepare a personal budget to save for a medium-term goal such as purchasing a car use technology to carry out efficient calculations giving answers to a reasonable level of accuracy, eg carry out and check calculations and represent answers in numerator-denominator, mixed number or decimal form as required, eg $4\frac{3}{4} - 2\frac{1}{3} = 2\frac{5}{12} = 2.41666$ and discuss the suitability of each form in a given context for computation determine a suitable level of accuracy for calculation, eg what is the side length of a square with an area 90 square metres to the nearest cm? solve a range of problems involving ratios, eg scales on maps, fuel mix for a two-stroke lawnmower, gear ratios for a mountain bike

Indicators

The curriculum scope for planning and assessing learning within **Band 4 (cont)**

Knowledge and skills	Working mathematically
Fractions, Decimals, Percentages, Ratio (cont) <ul style="list-style-type: none"> • solve problems involving rates, eg determine the flow rate of water if it takes 6 minutes and twenty five seconds to fill a 250L bath • use efficient strategies for estimating percentages • solve problems with inverse rates, eg 4 people can paint a house in 9 days, how long will it take 3 people to do it? • calculate fractions of lengths, areas, volumes and other continuous quantities using re-unitising, eg three quarters of one half is three eighths • use unitary method to solve problems involving proportional quantities, eg find the price of 4.5kg of fruit given the price of 2kg by first calculating the price of 1kg • apply effective written methods to carry out multiplication and division with decimals to at least thousandths by one-digit numbers or decimal fractions or two-digit multiples of 10, eg 2.852×0.3 	Fractions, Decimals, Percentages, Ratio (cont) <ul style="list-style-type: none"> • interpret the use of fractions, decimals and percentages in everyday descriptions of products, eg determine fat content of food products; determine the GST in purchases of luxury goods and services; evaluate discounts on sale items in a shopping catalogue; analyse performance data for athletes or sport teams • divide a quantity by a given ratio in everyday contexts, eg convert a recipe for 6 people to a recipe for fewer people • solve problems involving simple rates, eg determine how much time someone will take to run 2.5 km if they can run a kilometre in about 5 minutes; how long would it take to travel between Alice Springs and Tennant Creek at an average speed of 100km/hour? • determine fractions between two given fractions using equivalence, conversion to decimals or percentages, and proximity to benchmark fractions, eg find fractions between $\frac{2}{5}$ and $\frac{1}{2}$; $\frac{1}{4}$ and $\frac{3}{10}$; $\frac{5}{4}$ and $\frac{6}{5}$ • explain why division of a fraction is equivalent to multiplication by its reciprocal • predict and investigate which divisions result in terminating and non-terminating decimals using prime factors, eg find prime factors of 20, 16, 25, 28, 15, 40, 18, 36, 70; find which divisions result in terminating/non-terminating decimals $1 \div 16$, $1 \div 25$, $1 \div 28$, $1 \div 15$ and decide whether to round up or down

Key Mathematical Language	
integers, natural numbers rational and irrational numbers (including representing π) use index notation, eg 4^3 is 'four cubed' or 'four to the power of three' use working mathematically terms - conjecture, hypothesis, proposition, generalisation, deduction use problem-solving strategy list eg estimate, guess and check, look for a pattern, act it out, draw a picture, solve a simpler problem, use an equation, draw a table or graph, change point of view, make a list, try all possibilities, work backwards use terms such as simplify, evaluate, expand square numbers and square roots, cube numbers and cube roots, perfect square, triangular numbers	highest common factor (HCF), lowest common multiple (LCM) divisibility rules multiplier, divisor significant figure, recurring decimal, approximate (\approx) constant/variable reciprocal inverse relationship direct proportion ratio 'one to two' represented as 1:2 finite, infinite convert, conversion financial - debt, credit, fixed and variable interest rate unit price recurring

Mathematics

Number

Outcome

Band 5

Band 4

Learners extend knowledge of place value and multiplicative strategies to whole numbers and fractional numbers and compare and manipulate a wide variety of decimals, common fractions, percentages and ratios. They order and manipulate integers and apply an emerging understanding of the inverse relationship between powers and roots.

Learners combine system knowledge of place value with formal notation to represent, order and manipulate numbers of any size; accordingly they use scientific notation, read and represent recurring decimals and specify and represent significant figures and degrees of accuracy.

Learners demonstrating solid evidence of

N 5.1 Numbers and number systems

- order, read, interpret and represent very large and small numbers using scientific notation
- express recurring decimals as common fractions
- apply index laws to simplify and evaluate arithmetic expressions, interpret and manipulate negative indices
- round numbers to a specified number of significant figures
- convert rates from one set of units to another

N 5.2 Calculating

- use technology to undertake tasks involving iterative processes and basic statistics
- explain the effect of truncating and rounding on accuracy in calculations; determine appropriate levels of accuracy for the context and take account of truncation variations when using calculators
- solve problems involving rates and ratios requiring conversion of units

Band 5+

Learners describe the difference between rational and irrational numbers including the distinction between recurring and infinite non-recurring decimals. They order, manipulate and represent surds in different forms. Learners represent, order and manipulate logarithms.

Indicators

The curriculum scope for planning and assessing learning within **Band 5**

Knowledge and skills

Numbers and number systems

- use scientific notation to represent and interpret very large or very small numbers, including entering and reading scientific notation displayed on calculators
- represent numbers expressed in scientific notation in standard notation and vice versa
- compare and order numbers expressed in scientific notation
- represent numbers written in index form using terms such as base, power, index, exponent
- translate between numbers expressed in index form including negative indices, and standard notations

Working mathematically

Numbers and number systems

- use scientific notation to represent and interpret numbers in practical situations, including results arising from the use of technology for computation, eg national debt of \$234 billion = 234 000 000 000 = 2.34×10^{11}
- derive or prove index laws arithmetically
- identify and explain common misconceptions of index laws, eg $3^2 \times 3^4 \neq 9^6$
- apply index laws to develop and manipulate index notation, eg in chemistry for very small particle sizes and astronomy for very large distances
- when estimating, justify reasoning whether to round up or down based on the context

Indicators

The curriculum scope for planning and assessing learning within **Band 5 (cont)**

Knowledge and skills	Working mathematically		
<p>Numbers and number systems (cont)</p> <ul style="list-style-type: none"> determine the sign of the product when negative integers are raised to a power identify, read and interpret significant figures, including rounding numbers to a specified number of significant figures use formulae to determine rates requiring conversion of units, eg determine the velocity of an object in metres per second when given the distance in kilometres <p>Calculating</p> <ul style="list-style-type: none"> use automatic recall of decimal and percentage equivalents of common fractions to calculate the percentage of a quantity, eg calculate 30% discount of the recommended price of a good or service ensure the number of significant figures in the result of a calculation does not exceed that of any of the quantities used in the calculation identify and explain direct proportion in real life contexts, eg ascertain ratio of ingredients when increasing quantities calculate simple yearly interest on a loan and use tables or technology to calculate compound interest convert units in order to compare rates, eg km/h to m/s; annual interest rate of 6% is 0.5% per month; calculate how many km/litre given a fuel consumption of 7.6litres/100km 	<p>Numbers and number systems (cont)</p> <ul style="list-style-type: none"> develop the meaning of the zero index and negative integers by studying patterns use a spreadsheet to investigate positive and negative indices <p>Calculating</p> <ul style="list-style-type: none"> solve problems involving personal finances, eg calculate discounts, best buys and loan repayment schedules based on simple interest; select a mobile phone contract; calculate earnings considering gross pay; deductions and net pay evaluate a business-related decision or strategy to maximise returns through a fund-raising initiative compare daily/monthly interest rates on a small loan including repayment schedules, different bank accounts and charges use currency exchange rates to convert Australian dollars to foreign currencies and describe the movement of currency values over a short period of time to determine the best yield for a given exchange rate use a calculator correctly to solve problems, eg apply order of operation and appropriately truncate or round calculator displays 		
<p>Key Mathematical Language</p> <table border="1"> <tr> <td>use scientific notation 2.48×10^{-3} is 'two point four eight times by ten to the power of negative three' magnitude base, power, index, exponent, index laws</td><td>financial - simple interest (principal x rate x time), mortgage, lump sum, repayment schedule, stamp duty, deductions, gross and net pay, exchange rate, investments, Australian Stock Exchange (ASX), insurance, superannuation</td></tr> </table>		use scientific notation 2.48×10^{-3} is 'two point four eight times by ten to the power of negative three' magnitude base, power, index, exponent, index laws	financial - simple interest (principal x rate x time), mortgage, lump sum, repayment schedule, stamp duty, deductions, gross and net pay, exchange rate, investments, Australian Stock Exchange (ASX), insurance, superannuation
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Mathematics

Number

Outcome

Band 5+

Band 5

Learners combine system knowledge of place value with formal notation to represent, order and manipulate numbers of any size; accordingly they use scientific notation, read and represent recurring decimals and specify and represent significant figures and degrees of accuracy.

Learners describe the difference between rational and irrational numbers including the distinction between recurring and infinite non-recurring decimals. They order, manipulate and represent surds in different forms. Learners represent, order and manipulate logarithms.

Learners demonstrating solid evidence of

N 5+.1 Numbers and number systems

- represent, order and manipulate rational and irrational numbers
- represent surds as both roots and fractional indices
- represent order and manipulate quantities expressed as logarithms

N 5+.2 Calculating

- use technology to enhance efficiency in complex and repetitive calculations
- perform calculations with surds and logarithms
- solve problems involving non linear rates and ratios

Indicators

The curriculum scope for planning and assessing learning within **Band 5+**

Knowledge and skills

Numbers and number systems

- simplify expressions involving surds
- express recurring decimals as fractions
- express exponential numbers in logarithmic form and vice versa
- represent rational and irrational numbers together on a number line
- convert between representations of surds in negative index and root forms
- evaluate numerals involving fractional indices as decimal approximations

Working mathematically

Numbers and number systems

- investigate and report on a variety of logarithmic scales in practical situations, Richter Scale, decibel scale, pH
- compare and contrast a variety of numerical patterns such as triangular numbers and Pascal's triangle, shutter speeds (in fractions of a second) and aperture size (f number) on cameras
- formulate order of magnitude estimates for Fermi problems, eg how many litres of milk would be consumed by Australians in a day?
- use dynamic geometry software to geometrically represent irrational numbers, eg $\sqrt{2}$
- identify irrational numbers represented as a sloping line on a virtual geoboard
- use a spreadsheet to investigate fractional indices
- prove that $x^{1/2} = \sqrt{x}$

Indicators

The curriculum scope for planning and assessing learning within **Band 5+ (cont)**

Knowledge and skills	Working mathematically		
<p>Calculating</p> <ul style="list-style-type: none"> • solve problems that involve inverse proportions in which one variable increases as the other variable decreases • solve problems involving inverse squared proportional relationships, eg determine the brightness of a light at a given distance from its source • identify and use appropriate logarithmic laws in order to solve problems, eg growth and decay • use base 10 logarithms to solve equations, eg $2^{x+1} = 3$ • use formula to calculate depreciation • use formula to calculate compound interest 	<p>Numbers and number systems (cont)</p> <ul style="list-style-type: none"> • identify and compare properties of sets of numbers such as natural, rational and irrational numbers, integers • define real numbers and differentiate between rational and irrational numbers <p>Calculating</p> <ul style="list-style-type: none"> • decide on an appropriate level of accuracy for calculations given a situation or problem and assess the effect of truncating and rounding on the accuracy of results • create a detailed personal budget and adjust estimates as variables, eg make allowances for CPI changes, interest rate fluctuations, wage increases • make financial decisions based on calculations, eg early repayment of a personal loan, lump sum payments towards paying off a home mortgage • compare and contrast different loan or credit lines to purchase goods and services taking account of variables: interest rates, application fees, stamp duty, methods of repayment • use technology, a calculator or spreadsheet to solve financial problems which require organisation of information and analysis of change over time, eg investigate profit and loss for an enterprise • use electronic methods to complete complex and repetitive calculations which may include evaluations of results at several stages, eg use a spreadsheet to calculate the balance of a loan after 20 successive months • explain the effect of different methods of approximation on the closeness of an estimate for different operations, eg rounding for pi early in a series of calculations instead of applying the pi approximation at the end of calculations 		
<p>Key Mathematical Language</p> <table border="1"> <tr> <td>rational and irrational numbers</td><td>logarithms, surds, truncation financial - depreciation, compound interest, consumer price index, inflation, recession</td></tr> </table>		rational and irrational numbers	logarithms, surds, truncation financial - depreciation, compound interest, consumer price index, inflation, recession
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